(54) **AN EMULATION TEST DEVICE AND METHOD**

(57) A device for emulation test includes a communication module and a testing module. A method for emulation test includes acquiring, by a testing device, information to be tested according to a received test command and acquiring, by the testing device, the type of the DSLAM port to be tested or the MODEM information according to the information to be tested. Subsequently, the testing device informs a wire-grabbing device to connect the line to be tested to itself, performs xTU-C and xTU-R emulation test according to the information to be tested and the type of the DSLAM port to be tested, or the information to be tested and the MODEM information, and reports the testing result. Accordingly, both the xTU-C emulation test and the xTU-R emulation test for the user-side MODEM can be performed at the same location.
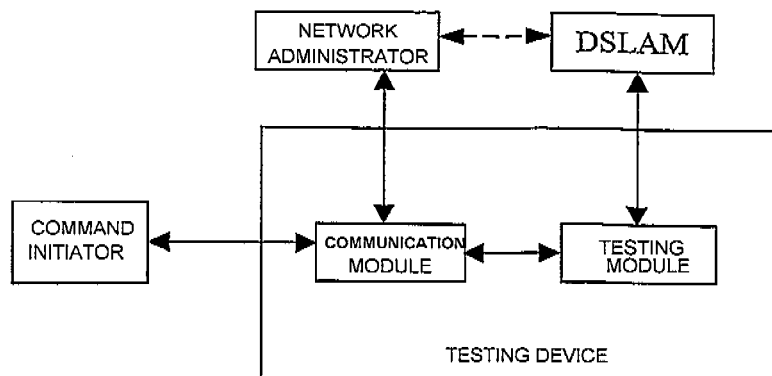
Fig. 3

EP 2 007 071 A2

Description

CROSS REFERENCE

[0001] The application claims the priority of CN application No. 200610066626.8, filed on April 13, 2006 with the State Intellectual Property Office of the People's Republic of China, entitled "METI-10D AND DEVICE FOR EMULATION TEST" the contents of which arc incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to x Digital Subscriber Line family (xDSL), more particular, to device and method for emulation and test used in xDSL service.

BACKGROUND

[0003] With the increasing maturity and development of the xDSL technology, xDSL technology has been more and more widely adopted in the technical field of broadband network access. Currently, the xDSL technology for broadband network access mainly includes three technologies, namely, Asymmetric Digital Subscriber Line/Asymmetric Digital Subscriber Line 2+ (ADSL/ADSL2+), Very High Speed Digital Subscriber Line (VDSL), Symmetric High-speed Digital Subscriber Line (SHDSL). Digital Subscriber Line Access Multiplexer (DSLAM), functioning as an access aggregating device, may provide users with a high speed access to broadband network using different technologies, based on the difference between user requirements and the real line conditions.

[0004] In the case of a relatively far distance from the user, ADSL/ADSL2+ technology may be employed to provide users with access to broadband network.

[0005] In the case of a very short distance from the user, VDSL technology may be employed to provide users with a high speed access to broadband network.

[0006] In the case when the user requires a symmetrical upstream and downstream service, SHDSL technology may be used to provide a broadband network access with a symmetrical upstream and downstream traffic for the users.

[0007] Figures 1 is a prior art diagram in which users access a DSLAM device. Usually, a user terminal couples to the DALAM device via MODEM, twisted pair, Main Distributing Frame (MDF), wherein the user terminal and MODEM belong to user-side devices, while the MDF and DALAM belong to Central Office end devices, and twisted pair may be incorporated with a variety of technologies.

[0008] With the constant and rapid growth of the broadband network, there are increasing conflicts between the existing manual maintenance and test, and the development of the scale of the network. As a result, a variety of testing technologies emerge. As can be seen from Figure 1, when any fault occurs during user's access to the broadband network, three main parts, i.e., user-side MODEM, twisted pair connecting the user and the DSLAM, and DSLAM, need to be diagnosed. The so called emulation test primarily tests the user-side MODEM and Central Office side DSLAM. Usually, the test of user-side MODEM is often referred to as the emulation test of xDSL transceiver unit-remote end (xTU-R). The test of DSLAM is often referred to as the emulation test of xDSL Transceiver Unit-Central Office (xTU-C).

[0009] The existing xTU-C emulation test is: to replace the original DSLAM port with another DSLAM port to connect and activate the user MODEM so as to determine if there is any problem with the DSLAM port. The details arc described below.

[0010] Assume that the user MODEM is now connecting to port A of the DSLAM via twisted pair. An error occurs when the user connects to the broadband network. At this point, the DSLAM directs the subscriber line to port B of the DSLAM. If the user MODEM can be correctly activated with port B of the DSLAM, then it is determined that the original port A of the DSLAM connecting the user is at fault. If the user MODEM could not be correctly activated with port B either, then it is roughly determined that it is the user's twisted pair or the user's MODEM that impairs the correct user access. For the users with ADSL/ADSL2+, VDSL, SHDSL, test can be done by selecting the DSLAM ports of the same manner according to the different approaches for user access.

[0011] The existing xTU-R emulation test is to replace the original MODEM with another MODEM to connect and active the DSLAM corresponding to the user so as to determine if the user MODEM is in a normal state. The specific procedure is similar to that of the xTU-C emulation test, which is omitted herein for brevity.

[0012] It can be seen that the existing xTU-C and xTU-R emulation tests are relatively independent of each other. One can not carry out both xTU-C emulation test and xTU-R emulation test for the user-side MODEM at the same location (physical location). Moreover, when operating the xTU-C emulation test, the resources, *i.e.*, the DSLAM ports, arc taken up, which means that DSLAMs with different chassis or DSLAMs by different manufacturers may not be able to share DSLAM ports for testing so that each chassis requires a free DSLAM port for testing and thus the resources of the DSLAM ports are wasted.

SUMMARY

[0013] In view of this, an embodiment of the present invention provides a device for emulation test. Another embodiment of the present invention provides a method for emulation test. These embodiments enable the xDSL service to perform both the xTU-C emulation test and the xTU-R emulation test for the user-side MODEM at the same location when the xDSL service is conducting the emulation test.

[0014] To accomplish the above ends, the technical

solutions to the embodiments of the present invention can be implemented as below.

[0015] An device for emulation test includes a communication module and a testing module. The communication module is configured to inform a wire-grabbing device in a system to connect a line to be tested to the testing module based on a test command from an initiator of an external test, transmit an emulation test command including the type of the digital subscriber line access subscriber (DSLAM) port to be tested or MODEM information to the testing module, and return a testing result received from the testing module to the initiator of the external test. The testing module performs emulation test according to the received test command.

[0016] A method for emulation test includes steps of: acquiring, by a testing device, information to be tested according to a received test command and acquiring, by the testing device, the type of the DSLAM port to be tested or the MODEM information according to the information to be tested; informing, by the testing device, a wire-grabbing device to connect the line to be tested to itself, performing the emulation test according to the information to be tested and the type of the DSLAM port to be tested, or the information to be tested and the MODEM information; and reporting the testing results.

[0017] It can be seen from the foregoing embodiments of the present invention that the testing device acquires information to be tested according to the received test command and acquires the type of the DSLAM port to be tested or the MODEM information according to the information to be tested. Subsequently, the testing device informs a wire-grabbing device to connect the line to be tested to itself, performs a corresponding xTU-C or xTU-R emulation test according to the information to be tested and the type of port to be tested and reports the testing result. Accordingly, both the xTU-C emulation test and the xTU-R emulation test for the user-side MODEM can be performed at the same location.

BRIEF DESCRIPTION OF THE DRA WING(S)

[0018] Figure 1 is a schematic diagram of a system for user's access to the DSLAM device according to prior art;

[0019] Figure 2 is a schematic diagram of an user access system, including the testing device, according an embodiment of the present invention;

[0020] Figure 3 is a schematic architecture of the testing device according to one embodiment of the present invention;

[0021] Figure 4 is a schematic architecture of the testing module in the testing device according to an embodiment of the present invention; and

[0022] Figure 5 is a schematic flow chart of implementing the emulation test according to another embodiment of the present invention.

DETAILED DESCRIPTION

[0023] Detailed description is made below to the embodiments of the present invention in conjunction with the drawings.

[0024] As illustrated in Figure 2, an embodiment of the present invention configures a testing device in the Central Office side device. The testing device respectively connects directly to a network administrator and to each DSLAM, respectively, which is adapted to implement a variety of xTU-C and xTU-R emulation tests.

[0025] Referring to Figure 3, Figure 3 illustrates a schematic architecture of the testing device according to one embodiment of the present invention. The testing device includes a communication module and a testing module, wherein the communication module is configured to receive a test command from an initiator of an external test, parse the received test command, acquire the information to be tested, for example, the serial number of the DSLAM, chassis, slot and port to which the line to be tested corresponds, acquire the type of the DSLAM port to be tested or the MODEM information from DSLAM (not shown in the figure) or the network administrator of the DSLAM according to the information to be tested, inform a wire-grabbing device in the system to connect the line to be tested to the testing module, transmit to the testing module an emulation test command including the type of the DSLAM port to be tested or the MODEM information and return the testing result received from the testing module to the initiator of the external test. The testing module is configured to perform emulation test according to the received test command.

[0026] Specifically, the communication module includes a command parsing sub-module, an information acquiring sub-module and an information notification sub-module, wherein the command parsing sub-module parses the received test command, acquires information to be tested, and wherein the information acquiring sub-module acquires the type of the DSLAM port to be tested or the MODEM information from external, such as from DSLAM or the network administrator of the DSLAM, according to the parsed information to be tested. The information notification sub-module informs the wire-grabbing device in the system to connect the line to be tested to the testing module according to the type of the DSLAM port to be tested or the MODEM information, transmits an emulation test command including the type of the DSLAM port to be tested or the MODEM information, and returns the testing result received from the testing module, to the initiator of the external test.

[0027] The foregoing types of the DSLAM ports include, but not limited to, port types of ADSL/ADSL2+, SHDSL and VDSL. The MODEM information is the information of xDSL supported by the user connected via the MODEM.

[0028] The emulation test executed by the testing module is configured to be xTU-C or xTU-R emulation test. The testing module integrates the functionality of the

DSLAM port and the functionality of the user-side MODEM. In other words, the testing module has a DSLAM port testing unit and a MODEM testing unit, wherein the DSLAM port testing unit functions as the DSLAM port to be tested, and the MODEM testing unit functions as the MODEM to be tested. It is for the reason that the testing module can not only function as the DSLAM port to be tested, but also function as the MODEM to be tested, that the testing device can not only conduct the xTU-C emulation test, but also conduct the xTU-R emulation test for the user-side MODEM, which, therefore, facilitates the troubleshooting and maintenance by the maintenance person.

[0029] Referring to Figure 4, the above testing module may include any type of xDSL testing sub-module which, for example, includes, but not limited to, ADSL/ADSL2+ testing sub-module, or SHDSL testing sub-module, or VDSL testing sub-module, or any combination of the foregoing testing sub-modules. Since each testing sub-module includes a corresponding type of DSLAM port testing unit and MODEM testing unit, the testing module can function as the MODEM of ADSL/DSL2+, VDSL, SHDSL user, or function as the DSLAM port in a manner of ADSL/ADSL2+, VDSL, SHDSL, so as to conduct xTU-R and xTU-C emulation test for the user that has connected into the testing device. Moreover, the testing device may provide options tor supporting xTU-R, or xTU-C emulation test according to the specific situation and requirements, and may also provide options for supporting one or more types of xTU-R emulation test among ADSL/ADSL2+, VDSL, SHDSL. Alternatively, the testing device may provide options for supporting one or more types of xTU-C emulation test among ADSL/ADSL2+, VDSL, SHDSL. Apparently, since the testing module according to the embodiments of the present invention may support a variety of xDSL access technologies, the testing module may provide a plurality of DSLAMs or a plurality of types of DSLAM with a sharing port for xTU-C and xTU-R test, thus saving the resources of DSLAM ports.

[0030] The method for implementation of the emulation test is detailed below.

[0031] Referring to Figure 5, Figure 5 illustrates a schematic flowchart for implementing the emulation test according to anther embodiment of the present invention.

[0032] Step 501, the testing device acquires the information to be tested according to the received testing commands. The information to be tested is the serial number of DSLAM, chassis, slot and port to which the line to be tested corresponds.

[0033] Step 502, the testing device communicates with the network administrator of the DSLAM to acquire the information of the type of the DSLAM port to be tested or the MODEM information. Of course, alternatively, the testing device may communicate with the DSLAM to acquire the type of the DSLAM port to be tested or the MODEM information according to the serial number of DSLAM (this situation is illustrated in Figure 3). The type of the ports to be tested includes, but not limited to, ADSL/

ADSL2+, SHDSL and VDSL, which means that it can be of any type of xDSL. The MODEM information is the information of xDSL supported by the user connected via the MODEM.

[0034] step 503, the testing device determines whether the testing device itself has a testing sub-module corresponding to the type of DSLAM port to be tested or the MODEM information. If it has, step 504 is performed; otherwise, step 507 is performed.

[0035] Step 504, informing the wire-grabbing device to connect the line to be tested to itself. The wire-grabbing device may be a network administrator or other wire-grabbing device.

[0036] Step505, the testing device performs emulation test according to the information to be tested, and the type of DSLAM port to be tested or the MODEM information. The emulation test may be an xTU-C or xTU-R emulation test.

[0037] Step 506, a testing result is analyzed and reported. The process ends.

[0038] Step 507, a testing report including a value representative of the cause of failure is returned. The process ends. The value representative of the cause of failure may be set according to the actual application. For example, the testing device requires to be provided with a corresponding testing sub-module, etc.

[0039] The foregoing teachings are merely preferred embodiments of the present invention. It shall be noted that any improvement and modification can be made by one of the ordinary people skilled in the art without departing from the principle of the present invention. These improvement and modification shall be construed as being within the scope of protection of the present invention.

Claims

1. A device for emulation test, **characterized in** comprising:

   a communication module and a testing module, the communication module being configured to inform a wire-grabbing device in a system to connect a line to be tested to the testing module based on a test command from an initiator of an external test, transmit an emulation test command including the type of a digital subscriber line access subscriber (DSLAM) port to be tested or MODEM information to the testing module" and return a testing result received from the testing module to the initiator of the external test;
   the testing module being configured to perform the emulation test according to the received test command.

2. The device of claim 1, **characterized in that,** the communication module comprises:

a command parsing sub-module configured to parse the received test command and acquire information to be tested;

an information acquiring sub-module configured to acquire, from external, the type of the DSLAM port to be tested or the MODEM information to be tested according to the parsed information to be tested;

an information notification sub-module configured to inform the wire-grabbing device in the system to connect the line to be tested to the testing module according to the type of the DSLAM port to be tested or the MODEM information, transmit the emulation test command including the type of the DSLAM port to be tested or the MODEM information to the testing module, and return the testing result received from the testing module to the initiator of the external test.

3. The device of claim 1, **characterized in that,** the testing module has a DSLAM port testing unit and a MODEM testing unit, the DSLAM port testing unit being configured to function as a DSLAM port to be tested, and the MODEM testing unit being configured to function as a MODEM to be tested.

4. The device of one of claims 1 to 3, **characterized in that,** the testing module includes a plurality of xDSL testing sub-modules, or any combination of all of the xDSL testing sub-modules.

5. The device of one of claims 1 to 3, **characterized in that,** the emulation test is xTU-C emulation test or xTU-R emulation test.

6. The device of claim 2, **characterized in that,** the information to be tested is a serial number of DSLAM, chassis, slot and port to which the line to be tested corresponds.

7. The device of one of claims 1 to 3, **characterized in that**:the type of the DSLAM port to be tested comprises all types of xDSLthe MODEM information is the information of xDSL supported by a user connected via the MODEM.

8. The device for emulation test of claim 4 or 7, **characterized in that,** the xDSL comprises, but not limited to, ADSL/ADSL2+, SHDSL or VDSL.

9. A method for emulation test, **characterized in** comprising steps of:

acquiring, by the testing device, information to be tested according to a received test command, and acquiring the type of a DSLAM port to be tested or MODEM information according to the

information to be tested;

informing, by the testing device, a wire-grabbing device to connect a line to be tested to itself, performing emulation test according to the information to be tested and type of the DSLAM port to be tested or according to the information to be tested and the MODEM information, and reporting a test result.

10. The method for emulation test of claim 9, **characterized in that,** after acquiring the type of the DSLAM port to be tested or the MODEM information, the method further comprises determining, by the testing device, whether the testing device itself has a testing sub-module corresponding to the type of the DSLAM port to be tested or the MODEM information; performing the step of emulation test if the testing device has a testing sub-module corresponding to the type of the DSLAM port to be tested or the MODEM information; otherwise, returning a test report including a value representative of the cause of failure if the testing device does not has the testing sub-module corresponding to the type of the DSLAM port to be tested or the MODEM information; and ending.

11. The method of claim 9, **characterized in that**, the information to be tested is a serial number of the DSLAM, chassis, slot and port to which the line to be tested corresponds.

12. The method of claim 9, **characterized in that,** the type of the DSLAM port to be tested or the MODEM information is acquired from the DSLAM or a network administrator of the DSLAM; the type of the DSLAM port to be tested being any type of xDSL; the MODEM information being the information of xDSL supported by the user connected via the MODEM.

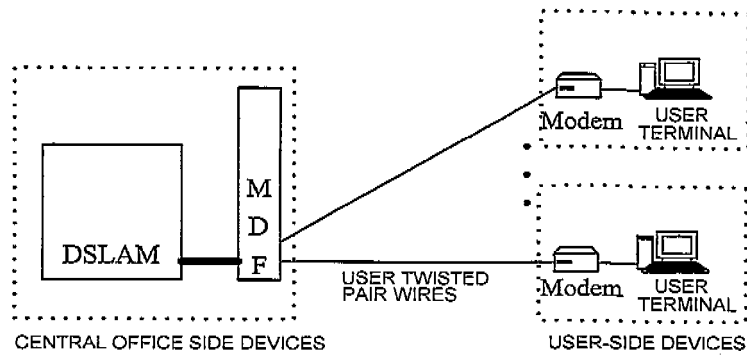13. The method of claim 9, **characterized in that,** the emulation test of step b is xTU-C or xTU-R emulation test.
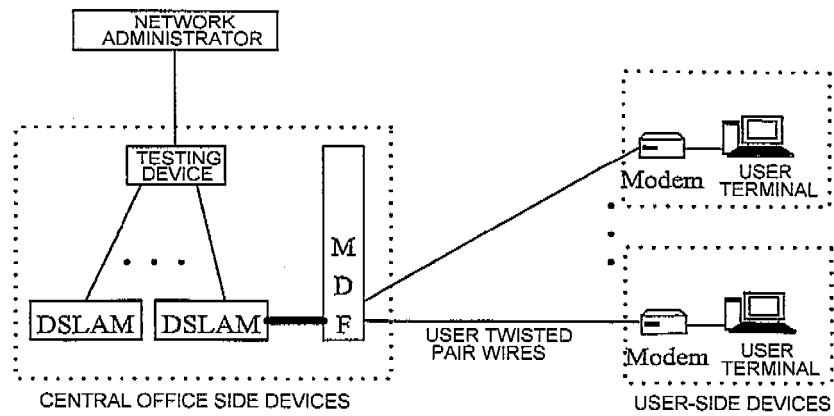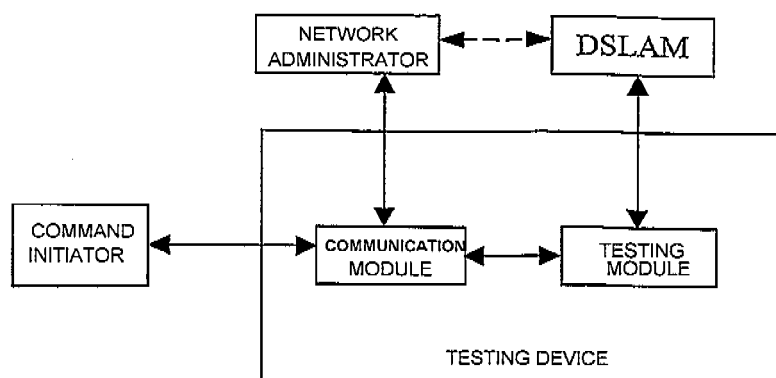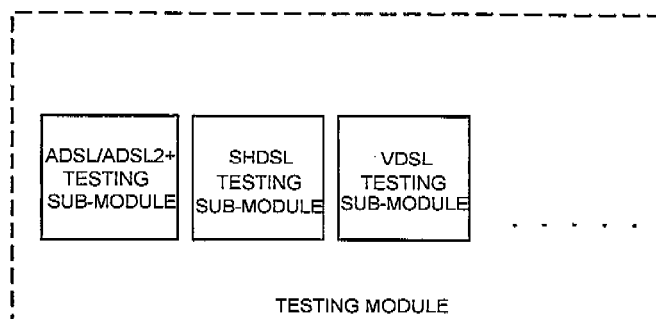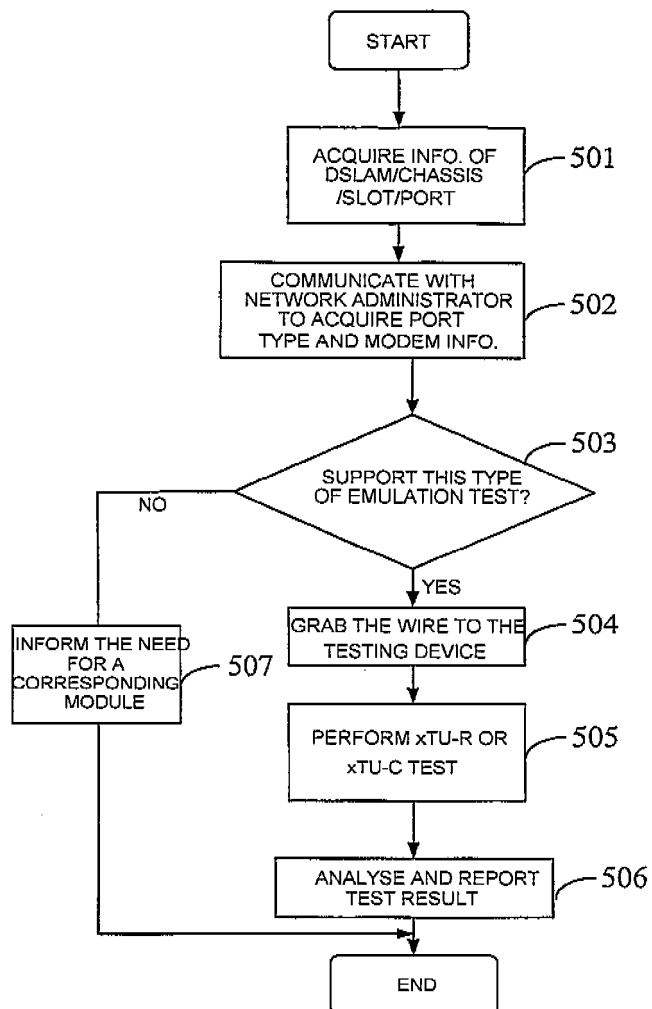
Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 200610066626 **[0001]**